Lesson 17: Four Interesting Transformations of Functions

Classwork

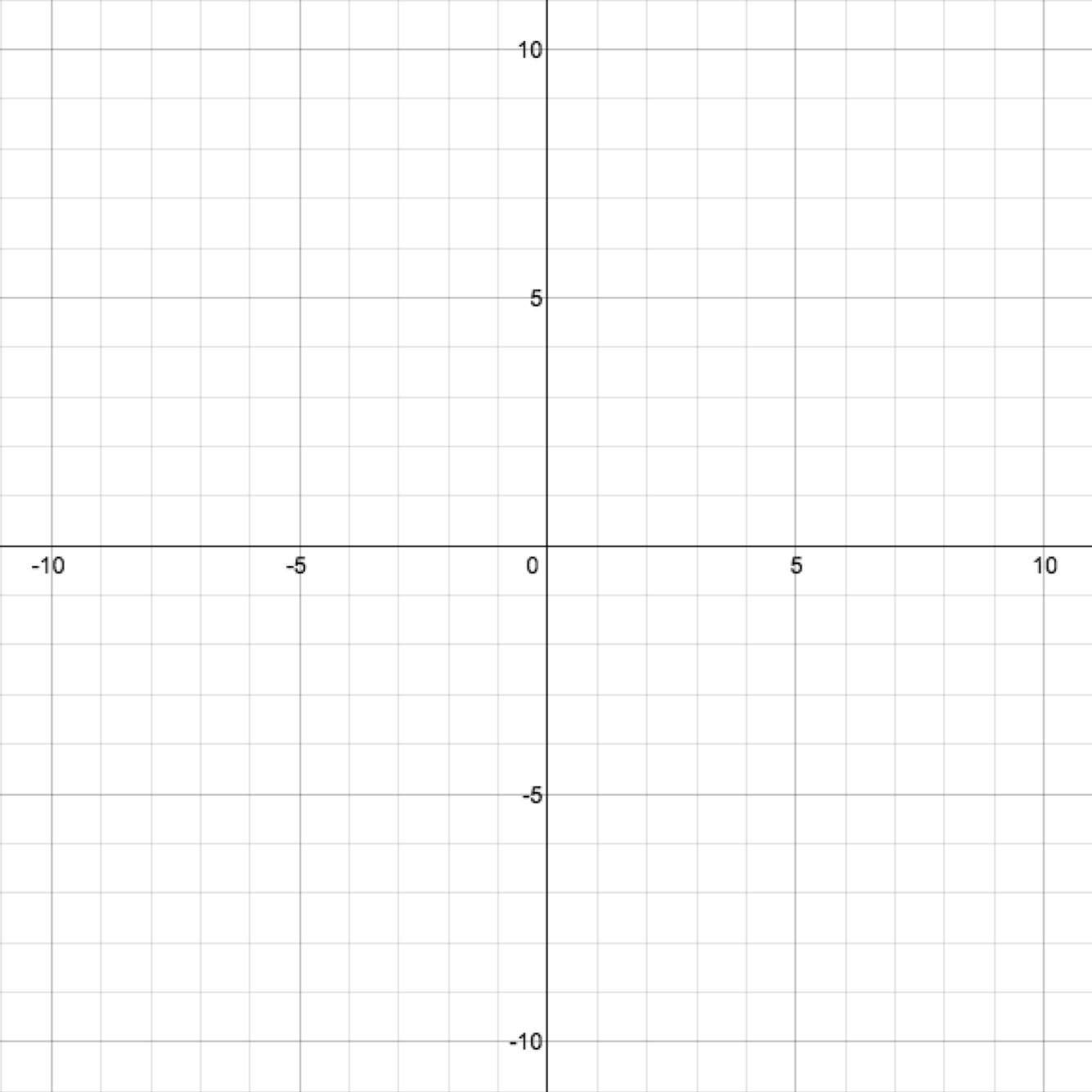
Exploratory Challenge 1/Example 1

Let , , for any real number .

1. Write an explicit formula for in terms of (i.e., without using notation):
2. Write an explicit formula for in terms of (i.e., without using notation):
3. Complete the table of values for these functions.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Graph all three equations: , , and .



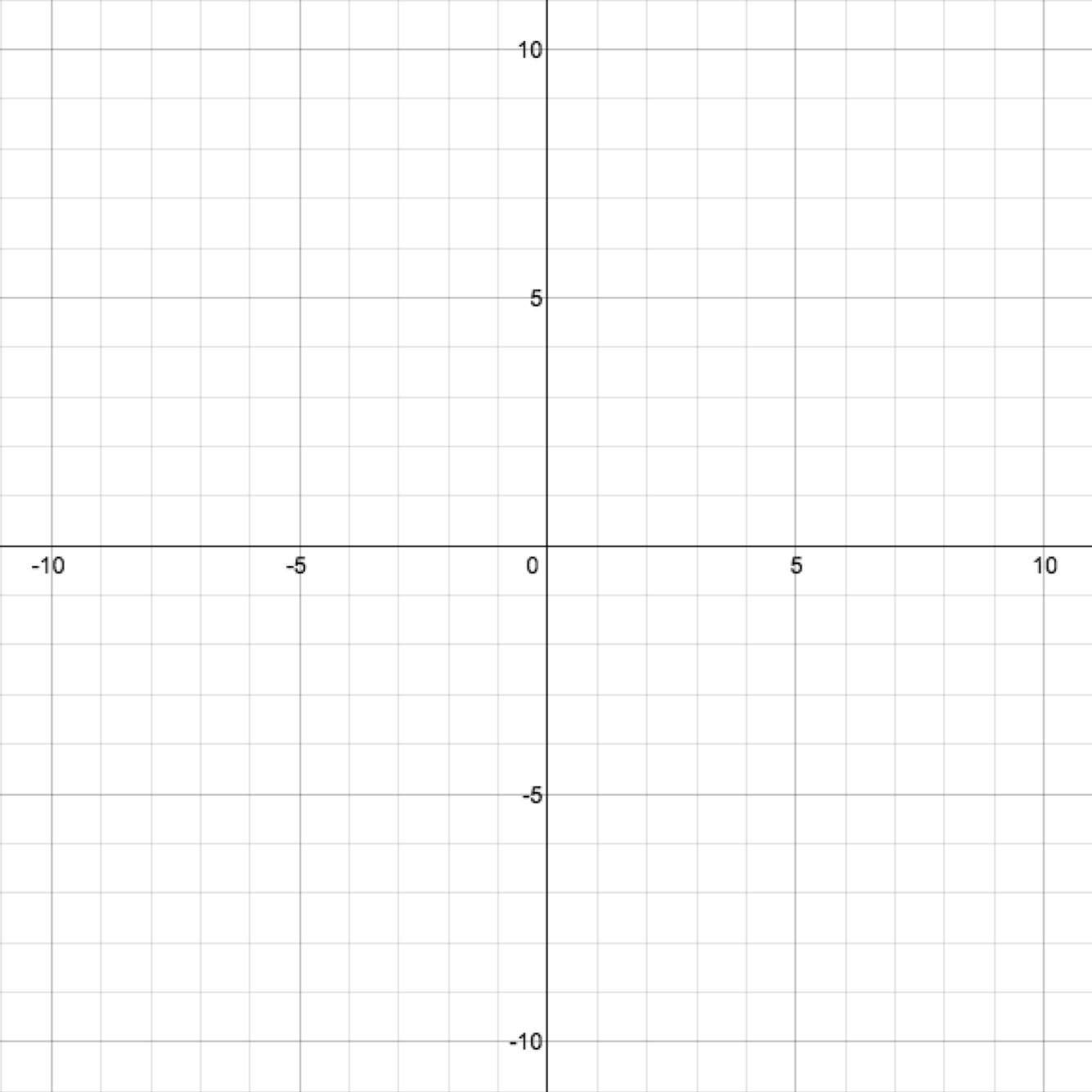
1. What is the relationship between the graph of and the graph of ?
2. How dothe values of and relate to the values of ?

**Exploratory Challenge 2/Example 2**

1. Let , , for any real number . Write a formula for in terms of (i.e., without using notation):
2. Write a formula for in terms of (i.e., without using notation):
3. Complete the table of values for these functions**.**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Graph all three equations: , , and **.**



Let , , for any real number .

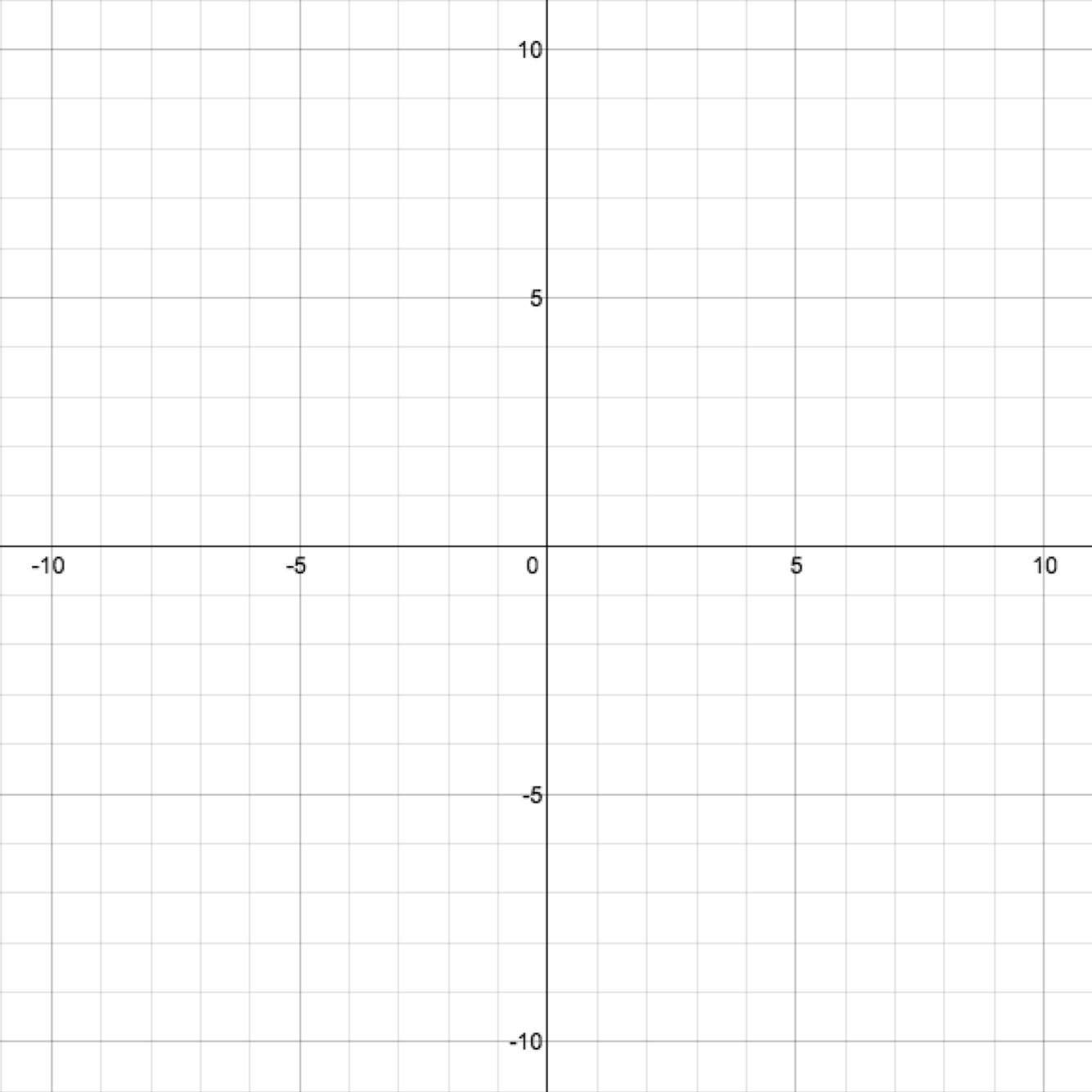
1. Write the formula for in terms of (i.e., without using notation):
2. Write the formula for in terms of (i.e., without using notation):
3. Complete the table of values for the functions , , .

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Graph all three functions on the same graph as , and .
2. How is the graph of related to the graph of when ?
3. How is the graph of related to the graph of when ?
4. How do the values of functions , and relate to the values of functions , and , respectively? What transformation of the graphs of , , and represents this relationship?

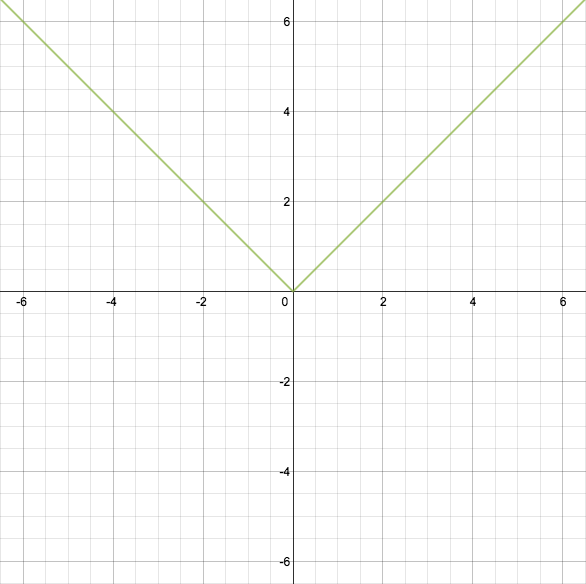
Exercises

1. Make up your own function by drawing the graph of it on the Cartesian plane below. Label it as the graph of the equation, . If and for every real number , graph the equations and on the same Cartesian plane.

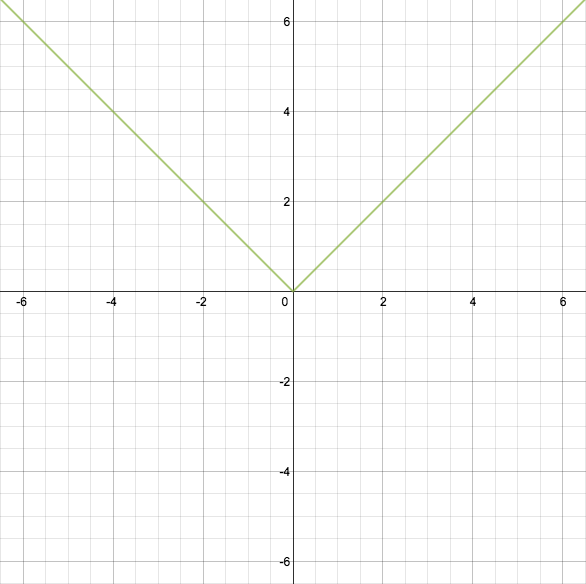


Problem Set

Let for every real number . The graph of is shown below. Describe how the graph for each function below is a transformation of the graph of . Then use this same set of axes to graph each function for problems 1–5. Be sure to label each function on your graph (*by* , *,* etc.).

1. 
3. Let and for every real number . The graph of is shown below. Complete the table below to generate output values for the function ; then graph the equation on the same set of axes as the graph of .

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |



1. Let for every real number . Let and be functions found by transforming the graph of . Use the graphs of and below to write the functions and in terms of the function . (Hint: What is the ?)

